

THE EFFECT OF MATING REPLACEMENT HEIFERS AS
YEARLINGS AND TWO YEAR OLDS ON HERD OUTPUT AND STRUCTURE

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SUMMARY

Herd simulation models were used to estimate the effect of varying replacement rates of yearling and two year old heifers on herd output and structure.

The combination of mating all replacement heifers as yearlings and mating cows for the last time at seven years of age raised the total herd saleable liveweight by a maximum of seven percent when compared with two year old first mating and final joining of cows at 12 years of age. Mating half of the replacement heifers as yearlings and half as two year olds together with a final joining of cows at 12 years of age gave a two percent increment.

Yearling mating increased the drought susceptibility of the herd by a 50 percent increase in the proportion of two and three year old pregnant lactating cows, but did not markedly alter the proportion of breeders older than eight years, when final joining age was 12 years.

INTRODUCTION

In temperate environments, replacement heifers in beef herds are generally mated as yearlings (c. 15 mo) to calve at two years of age whereas in tropical areas it is more common for heifers to be mated at two years (c. 27 mo) to have their first calf at three years or older.

Using data from the sub tropics Hall (1978) estimated that mating maiden heifers at 15 months influenced gross income from -3.8 to 11.7 percent when compared with maiden mating at two years. The models which indicated high return from maiden mating at 15 months assumed that survival and reproductive rates were similar in all breeding cow age groups.

It is generally accepted that death rates in two and three year old lactating breeders and those older than nine years increase relative to other groups. As environmental conditions become less favourable, these differences in mortalities can be expected to increase, especially during years of below average rainfall and subsequently poorer nutritional levels.

Younger age groups are more likely to incur dystocia losses (Wythes et al. 1976) and experience the effects of lactation anoestrus (Rudder et al. 1974).

Post and Reich (1980) reported that *Bos indicus* heifers in a tropical environment reached puberty at 260-280 kg live weight. In this environment, seasons have a marked effect on liveweight gains (Rudder et al. 1982) and this affects the proportion of maiden heifers reaching puberty by 15 months. Herd pregnancy rates also vary markedly between seasons and have been reported to vary from 53 - 97 percent, with two year old lactating breeders 15 - 20 percentage points below other lactating groups (Rudder and Seifert 1977).

Under these conditions it is necessary for management to evaluate the alternatives of preferential treatment for yearling heifers, the use of two year old maiden heifers, and various culling and remating strategies to maintain herd

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productivity. Taylor and Rudder (1982) demonstrated that managerial decisions affecting herd structure could have prolonged and confounding effects on gross income and herd productivity.

This paper describes the likely impact of yearling mating on herd productivity and potential drought susceptibility.

METHODS AND MATERIALS

The effect of mating heifers at yearling or two years and varying proportions of each age was assessed using two ages of cows at final joining (7 and 12). Grazing pressure was held constant at 2000 Adult Equivalents (A.E.) using factors outlined by Taylor and Rudder (1982) and productive levels were inferred from research results (Anon 1976, Rudder 1978).

Productive levels were assumed as:-

- . Breeding cow death rates of two percent (one to four depending on age) and death rates of one percent for growing and fattening classes were applied.
- . Weaning rates averaged 70 percent (68 for maiden mating at yearling and 73 when maiden mating at two years).
- . Maiden heifer pregnancy rates were 80 percent and the proportion of maidens mated at yearlings varied between 0 - 100 percent with the remainder required being two year old maidens.
- . Losses from established pregnancy to weaning were assumed to be 11 percent for the pregnant yearlings and five percent for all other pregnant age groups.
- . Bulls were used at four per 100 females mated. They had little influence on any outcome examined and were excluded from estimates of herd productivity.
- . Culling on the basis of physical defects was one to two percent according to age up to the final cow joining ages. Pregnant cull cows were allowed to rear that calf and were fattened following weaning. Non-pregnant cull cows were fattened and sold the year following their removal from the breeder herd.
- . Non lactating cows older than two years and lactating cows older than three years that failed to conceive at the next mating were culled.
- . Steers and cull heifers were sold by 42 months of age at 570 kg and 400 kg live weight respectively. Cull cow weights varied between 375 and 460 kg live weight depending upon age at sale.

RESULTS AND DISCUSSION

Effect on herd output

Mating all replacement heifers as yearlings increased total live weight sold from 5.2 percent (final joining at 12 years) to 6.8 percent (final joining at seven years). This effect is outlined in Fig. 1.

In each case the advantage to yearling mating was due largely to increased sales of steers (6 - 8 percent) and cull cows (10 - 7 percent) over two year maiden joining with final cow joining at 12 and seven years respectively.

These results indicate that where the nutrition is good enough to allow all replacement heifers to be mated as yearlings a maximum advantage of five to seven percent in sale live weight could be expected.

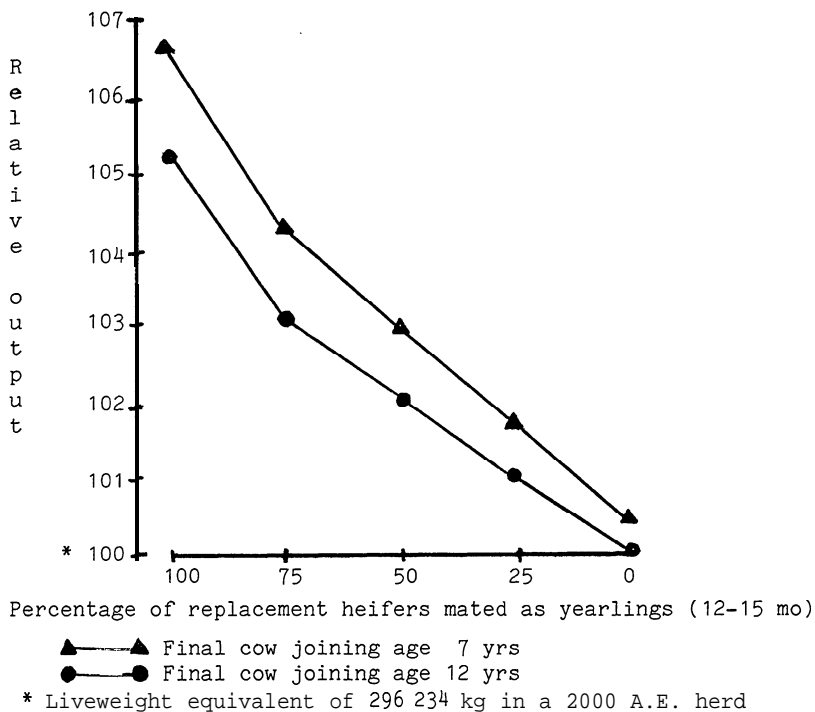


Fig. 1 The effect of mating varying percentages of replacement heifers as yearlings and two year olds at two final ages on total live weight sold

This advantage has to be balanced against varying nutritional conditions and achievable management alternatives. Yearling mating and final cow joining age of seven years is not realistically achievable over wide range of beef producing areas in the tropics. A greater proportion of the industry would be in a position to mate a proportion of maidens as yearlings, rejoin the empty two year olds and join cows finally at 12 years. In this situation the advantage to mating 50 percent of maidens as yearlings is reduced to a two percent increment in sale live weight. A substitution effect between sale liveweight of cull heifers and cull cows was evident as cow age at final joining increased. When cows were joined finally at seven years of age the percentages of cull cow, steer and cull heifer liveweight sold were 30:58:12. When the final joining age was increased to 12 years they were 23:59:18 respectively.

In a 2000 A.E. herd and with steer, cull cow and cull heifer prices at 90, 82 and 75 cents per kg liveweight (respectively) the advantage to yearling mating represents \$13 000 - \$16 000 annually. If only 50 percent of replacement heifers can be joined as yearlings the comparable advantage is \$6 000. Changes in income attributable to cow age at final joining depend on the relativity between the prices (c/kg) for cull cows and cull heifers.

Effect on herd structure

Any advantage in herd output to yearling mating must be measured against increased drought susceptibility of the herd. Breeding cows most at risk from the effects of down turns in nutrition are the younger (two and three year old) and older (9 + years) groups. The age distribution of pregnant breeders for each of

the four strategies is outlined in Table 1.

With final cow joining age at seven years the yearling maiden mating strategy showed 39 percent at risk compared with 26 percent when heifers were first mated at two years. With increased age of final joining and yearling mating, there were 31 percent in the younger group at risk and 19 percent in the older group at risk, compared with 20 and 23 percent for first mating at two years.

TABLE 1 Age distribution of pregnant breeders by strategy

Final age of joining	7 years		12 years	
Replacement heifer age	12-15 mo	24-27 mo	12-15 mo	24-27 mo
<u>Cow age</u>				
2	26		21	
3	13	26	10	20
4	16	16	13	13
5	15	19	12	14
6	12	15	10	12
7	10	13	8	10
8	8	11	7	8
9 +			19	23
	100	100	100	100
Pregnant breeders in 2000 A.E.	738	685	741	675

The results demonstrate that the decision to mate replacement heifers as yearlings has to be carefully balanced against the increased drought susceptibility of the herd. Managers and advisers to industry should carefully evaluate any preferential treatment required for yearling joining against the likely returns from increasing sale weights.

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